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To: R. Cox and B. Handy Date: June 06, 1991

From: W. S. Ryan, Jr. and C. Ament

Subject: Blend Components Evaluation #1: Request N90034

Samples of individual blend components were obtained by Chemical Analysis Section (CAS) personnel from the R & D Semi-Works Primary and C Pilot Plant facilities in November, 1990. The twelve samples were submitted as request N90034 and were analyzed for all chemical compounds currently measured by routine methods in the Chemical Analysis Section. The purpose of this study was to obtain information on the typical levels of chemical compounds as measured by the procedures used in CAS in these selected blend components. The samples are described in the following list.

Sample Code	Sample Description
N0BF-1	DBC Burley
N0BF-2	DBC Bright
N0BF-3	RCB
N0BF-4	RLTC
N0BF-5	RLB
N0BF-6	MT
N0BF-7	ES
N0BF-8	IS
N0BF-9	ESB
N0BF-10	DIET
N0BF-11	VST Bright Stem
N0BF-12	KST Burley Stem

The chemical components measured in the tobacco materials samples, the CAS symbol for the chemical species, the units of measurement for the analytical results and the procedure currently in use are listed in Table 1.

The analytical results are reported on a **Dry Weight Basis (DWB)** in the following seven tables. All analytical values except for glycerin and propylene glycol were determined on sample materials that had been ground to a 1 mm mesh in CAS. Glycerin and propylene and OVA values were determined using unground material.

Table 2: Group Analyses - Oven volatiles, pH, hot water solubles, petroleum ether extractables, total ash and total nitrogen by Leco.

Table 3: Nitrogenous and Other Inorganic Compounds - nitrate nitrogen, insoluble nitrogen, alkaloids, nicotine, soluble ammonia and phosphorus.

Table 4: Sugars, Carbohydrates and Other Organic Compounds - fructose, glucose, sucrose, starch and total reducing sugars, and the polyphenols, chlorogenic acid, rutin and scopoletin.

Table 5: Organic Acids - acetic, β-methylvaleric, citric, formic, lactic, malic, malonic, oxalic, pimelic and succinic acids.

Table 6: Elemental Analysis - calcium, magnesium, potassium, silicon, and sulfur by X-Ray; chlorine by titration; sodium by atomic absorption.

Table 7: Free Amino Acids - the individual free amino acid results have been added to provide a total free amino acid value.

Table 8: Hydrolyzed Amino Acids - the individual amino acid results have been added to provide a total hydrolyzed amino acid value.

Table 9: Processing Additives - propylene glycol, glycerin, propylparaben, sorbic acid and urea.

The following abbreviations are used in the tables: N.A. indicates analysis was not requested; I.S. indicates insufficient sample to analyze; and N.D. indicates chemical species was not detected by the analysis.

The values reported in this memo represent the typical levels of the chemical species in these twelve blend components from one sampling only. The sampling was not a composite taken to represent general composition of the components used in manufacturing but was a one-time "snapshot" of the cigarette process. A second sampling and testing will be done shortly to provide a another "snapshot"of the manufacturing process.

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Table 1

Chemical components measured: CAS Symbol: Units for reporting: Analytical procedure

Chemical Component	Symbol	Units	Analytical Procedure
Alkaloids	ALK	%	Colorimetric, CF, E-66
Ash	ATO	%	Gravimetric, A-7
Acetic Acid	IC-ACETIC	mg/g	Distillation, IC, E-70
β-methylvaleric Acid	GC-BMV	µg/g	Methylation, GC, E-63A
Calcium	Ca-XRAY	%	XRF
Chlorides	CHL	%	Titration, E-16A
Chlorogenic Acid	CGA	%	Extraction, LC, E-54A
Citric Acid	IC-CITRIC	%	Extraction, IC, E-88
Formic Acid	IC-FORMIC	mg/g	Distillation, IC, E-70
Free Amino Acids	FAA	mg/g	PITC derivatization, LC, E-64
Fructose	IC-FUC	%	Extracction, IC, PAD, E-72
Glucose	IC-GLU	%	Extraction, IC, PAD, E-72
Glycerine	GLY	%	Extraction, GC, FID, E-58B
Hot Water Solubles	HWS	%	Gravimetric, A-12A
Hydrolyzed Amino Acids	HAA	mg/g	Acid hydrolysis, LC, E-64
Insoluble Nitrogen	NIN	%	Digestion, CF, A-5A
Lactic Acid	GC-LACTIC	%	Methylation, GC, E-28B
Magnesium	MG-XRAY	%	XRF
Malic Acid	IC-MALIC	%	Extraction, IC, E-88
Malonic Acid	GC-MALONIC	%	Methylation, GC
Nicotine	GC-NIC	%	Extraction, GC, FID, E-86B
Nitrate Nitrogen	NNI	%	Colorimetric, CF, A-21
Oven Volatiles	OV	%	Gravimetric, E-4B
OV "AS-IS"	OVA	%	Gravimetric, E-4B
Oxalic Acid	IC-OXALIC	%	Extraction, IC, E-88
Petroleum Ether Extractable	PEE	%	Gravimetric, E-3
pH	PH	%	Potentiometric, E-53A
Phosphorus	PHO	%	Extraction, CF, E-57
Pimelic Acid	GC-PIMELIC	%	Methylation, GC

Table 1 (cont'.)

Chemical components measured: CAS Symbol: Units for reporting: Analytical procedure

Chemical Component	Symbol	Units	Analytical Procedure
Potassium	K-XRAY	%	XRF
Propylene Glycol	PG	%	Extraction, GC, E-58B
Propylparaben	PP	µg/g	Extraction, LC, E-68
Rutin	RUT	%	Extraction, LC, E-54A
Scopoletin	SCOP	%	Extraction, LC, E-54A
Silicon	SIL-XRAY	%	XRF
Soluble Ammonia	SON	%	Colorimetric, CF, E-56
Sodium	NA-AA	%	Extraction, Atomic absorption
Sorbic Acid	SOR	%	Colorimetric, CF, E-29A
Starch	STA	%	Enzymatic, CF, E-44B
Succinic Acid	GC-SUCCINIC	%	Methylation, GC
Sucrose	IC-SUC	%	Extraction, IC, PAD, E-72
Sulfur	S-XRAY	%	XRF
Total Nitrogen - LECO	NTO-LECO	%	Combustion, TCD
Total Reducing Sugars	TRS	%	Colorimetric, CF, E-66
Urea	URA	%	Colorimetric, CF, E-49A

Note: CF = Continuous Flow
GC = Gas Chromatography
IC = Ion Chromatography
LC = Liquid Chromatography
XRF = X-Ray Fluorescence